at a given frequency and at a given impedance, and an output which applies such power to an RF load having a non-constant impedance, such as an RF plasma chamber. The matching network has a phase-magnitude error detector providing a phase error signal and a magnitude error signal related respectively to the differences between nominal and actual input phase angle, i.e., $\Delta\Phi$ and between nominal and actual impedance ΔZ. The matching network has at least a first variable impedance having a driven element for varying its impedance, and a second variable impedance having a driven element for varying its impedance. The fuzzy logic control technique involves the steps of supplying the phase and the magnitude error signals to a fuzzy logic controller, wherein each error signal has a magnitude and direction. Then the error signals are each applied to a fuzzy logic inference function based on membership in one or more fuzzy sets, which may be overlapping fuzzy sets. The value, i.e., the size and direction of each error signal enjoys membership in one, two, or more overlapping fuzzy sets. Fuzzy logic rules are applied to the phase and magnitude error signals according to the fuzzy sets for which said first and second error signals enjoy membership. A plurality of drive signal values are obtained, based on the fuzzy logic rules for each of the phase and magnitude error signals. The drive signal values are weighted according to respective fuzzy inference functions for which the error signals enjoy membership. Then the weighted drive signal values are combined to produce an output drive signal for the first variable impedance device driven element. A similar process creates an output drive signal for the second variable impedance. According to the fuzzy logic rules, the phase and magnitude error signals are used jointly to obtain each of the output drive signals.

Please replace the paragraph starting at column 4, line 66, with the following paragraph:

With reference to the Drawing figures, and initially to FIG. 1, an RF plasma processing system 10 is shown for purposes of example. A plasma generator 12 provides RF electrical power at a predetermined frequency, i.e., 13.56 MHz. The output of the generator 12 is followed by a harmonic/subharmonic filter 14, which is then followed by an impedance matching network 16, which supplies the electrical power through a voltage/current sensor system 18 to an input of a plasma chamber 20. The matching network 16 comprises a controllable impedance matching unit 22 with a phase/magnitude sensor 24 connected at its input. The sensor provides a phase error signal $\Delta\Phi$ that is proportional to the difference between the nominal input impedance phase angle and the actual phase angle $(\Phi-\Phi_0)$ of the impedance matching unit, and also provides a magnitude error signal ΔZ that is proportional to the difference between the nominal input impedance and actual input impedance $(Z-Z_0)$.

IN THE CLAIMS

Please amend the claims in accordance with the following.

1. (TWICE AMENDED) Fuzzy logic method of tuning [an RF] a radio frequency (RF) matching network of the type having an input at which is applied RF power at a given frequency and at a given impedance, and an output which applies said power to an RF load having a non-constant impedance, said matching network